

BOOK REVIEWS

FLORA OF SOUTH AUSTRALIA, Part I (Third Edition), by J. M. Black, revised and edited by John P. Jessop, with pp. 466, 467 line drawings and 16 full colour plates: Adelaide: Government Printer, 1978. Aust. \$16,90.

John Jessop, a gain to Australia from South Africa, must have felt very much at home while editing this first volume of the updated flora of South Australia. Of the 38 species of Iridaceae listed, no less than 33 are indigenous to South Africa! Early travellers from Europe made full use of their stopover at the Cape to enrich the sandy areas of Australia.

From Lycopodiaceae to Orchidaceae, the scope of the present volume, we share 153 genera in common (out of a total of 277), a feature which makes this book of interest to South Africans.

J. M. Black's classic work on the flora of South Australia is in the process of being updated once again and this first volume will be especially welcomed by Australian botanists and informed laymen.

D. G. Frodin remarked in the *Gardens' Bulletin, Singapore*, (Vol. XXX, 1977: 239) that the "most satisfactory style for a Flora at the present time should be one of conciseness and practicality". This, and Bentham's plea for "correctness and clearness of method and language" were faithfully adhered to by the late Dr Black, and the present volume continues in the same vein.

In this edition three new species and eight new combinations are published. For the most part species' descriptions have been updated rather than revised, as mentioned by Jessop in his introduction. However, keys have been substantially rewritten and the indented system used is clear and works well.

New features include references to the place of publication of species as well as to relevant illustrations. Reference is made to recent revisions of genera. Flowering times and the range of distribution have been added. Many common names have been included, not all of which are in general use in South Australia as they have been culled from J. H. Willis's *Handbook to Plants in Victoria*.

Many new line drawings have been added and there is approximately one to each page of text. The detailed orchid drawings by L. Dutkiewicz are very good but all drawings have had to be so reduced in size that they cannot compare with the illustrations in our own *Flora of Southern Africa*. However they will certainly be a useful guide to identification.

The 16 full-page plates in coloured pencils by C. E. Woolcock are a pleasant addition but probably account for some of the increased price of this edition.

The book is a convenient size for taking into the field but the very attractive cloth cover, being mainly white, would soon show the marks of any such foray. Good quality paper has been used and the print is clear if rather small. Variations in type are clear and useful.

There is a good glossary and useful tips on the collection of specimens, in the beginning of the book. At the back is an index, only to families and genera (as in the *Flora of Natal*). On the inside of the back cover there is a map of the state of South Australia divided into the regions used by their herbarium. The area covered is approximately the same as that of the Republic of South Africa.

This volume has been produced with commendable speed and the editor and his colleagues are to be congratulated on their work. It is hoped that volumes 2, 3 and 4 will follow without too much delay.

This work will be of tremendous value to all those concerned with the flora of South Australia and neighbouring areas. It will also be a useful companion to the subsequent volumes in which some of our "green cancers" will feature.

PAULINE FAIRALL

AN ILLUSTRATED GUIDE TO POLLEN ANALYSIS, by P. D. Moore and J. A. Webb, with pp. 133. Hodder & Stoughton, 1978. (P.O. Box 702, Mill Road, Dunton Green, Sevenoaks, Kent, TN13 2YD.) £8.50 (board), £4.95 (unibook).

The relatively young science of Palynology (the study of pollen grains and spores) which is practiced by many specialists all over the world in connection with past vegetation and climatic changes is becoming increasingly important in such disciplines as archaeology, pedology, taxonomy and phytogeography. It also has important applications in the fields of aerobiology with regard to human health, and melitopalynology concerning the study of honey. Moreover, in Europe there has in recent years been a demand for courses in palynology in high schools. In view of these developments the authors have compiled a book which embraces the many interesting facets and potentialities of pollen analysis in the hope of further stimulating research in this field of science.

This book of 133 pages is an excellent introduction to the study of the pollen grains of Angiosperms and Gymnosperms as well as the spores of the cryptogams. While of very high standard the book is written in a simple, lucid and concise style and is most interesting. The authors have succeeded in giving a total synthesis of a vast amount of data on this discipline including the development of this field of research and the new advances. The book also has many valuable practical assets and can be regarded as the most up to date account on palynology and includes many important references.

In the first chapter the potentialities of pollen analysis are discussed especially with regard to the study of past vegetation changes which can be dated and which form the basis for the reconstruction of climatic history. This is followed by a very useful and critical consideration of the types of deposits which can be analysed. In Chapter 3 the different methods of collecting samples from the stratified sequences are discussed together with the various chemical treatments necessary for the extraction of the palynomorphs from the matrix before mounting on slides. A very important chapter is the one on the structure and sculpturing of the pollen and spore walls as these form the basis for accurate identification of a vegetation type at a particular point in time. In this connection the value of transmission and scanning electronmicroscopy in addition to light microscopy is stressed. The complicated existing terminology concerning the pollen and spore wall is well sorted out and good illustrations and micrographs abound. The subsequent chapter provides an extremely useful and extensive pollen and spore key of many well-known genera together with a glossary. Of particular significance are the chapters in which the methods of pollen counting, pollen diagram construction and the interpretation of the pollen zones are critically discussed. The last chapter considers the future of pollen analysis.

For the valuable information provided in this book it is not expensive and it should certainly be acquired by all those interested in pollen and spores.

J. A. COETZEE

TROPICAL TREES AND FOREST: AN ARCHITECTURAL ANALYSIS, by F. Hallé, R. A. Oldeman and P. B. Tomlinson, with pp. xvii + 441, 111 figures and 605 references. Berlin, Heidelberg, New York: Springer-Verlag, 1978. Price U.S.\$62.50.

An architectural approach to trees and forests is a relatively new idea. Many of its concepts appear strange to the uninitiated; there is also a new terminology to be learnt. Once the initial reluctance to accept new things has been overcome this approach allows the familiar to be viewed through new eyes.

The authors have put together a highly competent synthesis of existing knowledge in this field which will serve as a foundation for future work.

The book consists of five chapters. The first outlines the new approach, defines the architectural concept of tree growth and gives a resumé of the botanical richness of the tropics.

The second chapter gives the ground work for the concept of architectural models in the formation of trees. The various stages of development from the seedling to the mature tree

are discussed. Rhythmic and continuous growth in terminal and lateral meristems, branching, flowering and secondary thickening are considered, all in relation to the trees architecture.

Chapter three describes the inherited architecture of the tree. The 24 different models, each named after a prominent worker in the field, are presented in an illustrated dichotomous key which is remarkably easy to follow, at least in theory. Examples and descriptions of each model are given and discussed.

Chapter four deals with the tree's response to its environment, "opportunistic tree architecture", and introduces the concept of energy exchange as a means of understanding the state of the forest.

The final chapter brings all these concepts together in the architecture of the forest. Three examples of actual plot descriptions are given from tropical forests. A description of "Sylvigenesis", which is defined as "the processes by which forest architecture is built", concludes the text. An useful glossary and full species and subject indices are given.

Several concepts are initially difficult for a forester to accept: the authors' views of what constitutes a tree are very broad; the idea that tree architecture is not taxonomically orientated comes as a surprise. Not only can different members of a family exhibit different architecture but differences can even occur at species level. The authors are at pains to stress that the well-known temperate tree is abnormal in the sense that its growth forms and resting periods are strictly defined. The floristically much richer, less inhibited trees of the tropics exhibit a much wider number of growth forms and growing periods and should be considered to be normal.

The book is well produced, the text is readable and the figures are clear. They are an invaluable aid to the understanding of the concepts presented.

Printers devils occur but the text is remarkably free from this sort of problem.

Minor points of disagreement with the authors such as:

breast height is more often 1,3 m than 1,4 m;

Araucaria cunninghamii should be Massart's model not Rauh's;

Eucalyptus globulus does not regenerate from root suckers but from lignotubers;

did nothing to distract from the overall fascination of the ideas presented.

Although this book should be prescribed reading for final year undergraduate students in botany, ecology and forestry, its price will put it beyond the reach of the average student.

D. G. M. DONALD

PHYSIOLOGY AND BIOCHEMISTRY OF SEEDS IN RELATION TO GERMINATION, VOL. I: DEVELOPMENT, GERMINATION AND GROWTH, by J. D. Bewley and M. Black, with pp. ix + 306, 122 figs. and 41 tables. Berlin, Heidelberg, New York: Springer-Verlag, 1978. Cloth DM 90. US\$45.00.

This book is part of a two-volume treatise. If the standard of volume 2 equals that of the first, the set will constitute a most comprehensive and refreshingly novel presentation of the known facts about the physiology of seeds and their germination in which attention is repeatedly drawn to deficiencies in our knowledge. The material is attractively presented and the authors have a writing style which ensures pleasant reading. The text is almost devoid of printing errors. Each chapter is concluded with two reference lists—one to articles of general interest and the other to research reports. The latter invariably is extensive and up to date. Unfortunately the titles of the research reports do not appear in the list of references.

The illustrations are sufficient, neat and clear. In addition to an extensive subject index, the book also contains an author index and a glossary and index of English and botanical plant names.

Although undergraduates should find the book valuable as a reference work, it will be used mainly by post-graduate students and research workers.

After an informative introductory chapter, the structure of seeds and the kinds of reserve substances that occur in seeds are concisely discussed without going into great detail. This

is followed by a lengthy chapter on seed maturation in which the biosynthesis of starch, protein and fats and oils receive considerable attention. A discussion on the influence of hormones such as the gibberellins, auxins, cytokinins and abscisic acid on seed development concludes the chapter.

Aspects of the water relations of seeds which are not often mentioned in textbooks feature prominently in the chapter which is devoted to the uptake of water by seeds and seedlings.

Chapter 5 is entitled: "Biochemistry of germination and growth." It contains a rigorous treatment of various aspects of respiration, nucleic acid and protein synthesis. In contrast to the critical approach which the authors generally employ, they uncritically discuss work which has been done with the so-called C_0/C_1 ratio method in attempts to establish the relative importance of the glycolytic and pentose phosphate respiratory routes in seeds and seedlings.

In the penultimate chapter the mobilization of reserve substances from the cotyledons or endosperm of seeds to the developing organs of the seedling is discussed. Substances such as alkaloids whose physiological importance is largely a matter of conjecture are not discussed. A weakness of the chapter is the omission of a discussion of the accumulation of amino acid amides and ammonia in seeds during germination under conditions that are conducive to etiolation because such conditions probably often prevail in nature. In general however, the discussion on the mobilization of reserve carbohydrates, proteins and especially fats and oils is done in a masterly and thorough way and is up to date.

The final chapter is devoted to the hormonal control of the mobilization of reserve substances in germinating seeds. Due to a lack of information on the subject, the discussion is devoted almost exclusively to the interaction of the gibberellins and α -amylase as has been studied extensively in germinating cereal grains.

N. GROBBELAAR

PRODUCTION ECOLOGY OF BRITISH MOORS AND MONTANE GRASSLANDS, edited by O. W. Heal and D. F. Perkins assisted by W. M. Brown, with pp. xii, 426 + 132 figures and 145 tables. Berlin, Heidelberg, New York: Springer-Verlag, 1978. Volume 27 in the series "Ecological Studies" edited by W. D. Billings, F. Golley, O. L. Lange and J. S. Olsen, Cloth DM 108, US\$54.00. ISBN 3 540 08457 6.

The Moor House National Nature Reserve was selected in 1965 by the U.K. IBP PT subcommittee as the main site for studies on moorland communities. Although moorlands are not strictly within the definition given for tundra, they are exposed to severe climatic conditions and moorland communities therefore have more in common with tundra than with the other major world biomes as recognised in the IBP (i.e. woodland, grassland and aridland). As such there is little of direct relevance in this volume for most South Africans, with the exception of those concerned with Afro-montane areas and with some of those concerned with heathland nutrition. Nevertheless, the volume is well presented and is a must for any scientific library.

The book is divided into 20 chapters, with separate sections dealing with the Moor House Programme and with supporting studies on the Dwarf Shrub Communities and Snowdonia Grasslands. In general the text is a thorough and detailed summary of moorland work done since 1965. All important aspects of ecosystem structure and function are well dealt with, and in this respect the text is useful background for anyone attempting an ecosystem study or for the teacher who wants relatively simple examples for his students.

The moorland system is basically a fairly simple system with only a handful of angiosperm species present. This simplicity is complicated by the low nutrient environment and grazing management pressures—so the study encompassed by the book is both academic and applied, which makes a useful combination. There are particularly good chapters on field estimates of primary production; the physiological aspects of bog

production; microbial populations in peat; the productivity of a *Calluna* heathland in southern England; primary production, mineral nutrients and litter decomposition in the grassland ecosystem; the grazing intensity and productivity of sheep in the grassland ecosystem; and on the distribution and transfer of energy and nutrients in the *Agrostis-Festuca* grassland ecosystem.

The overall appearance, quality and accuracy of the text; quality, accuracy and relevance of the illustrative matter; and the balance between illustrations and text are all of the highest standard. There is a very good bibliography and the volume is well indexed.

E. J. MOLL